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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/593,255

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Woosuck Shin

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EXAMINER

EOM, ROBERT J

ART UNIT

PAPER NUMBER

1797

NOTIFICATION DATE

DELIVERY MODE

08/05/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/593,255	<b>Applicant(s)</b> SHIN ET AL.	
	<b>Examiner</b> ROBERT EOM	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 25-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 25-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-8 and 25-30 have been considered but are moot in view of the new ground(s) of rejection.

The applicant has submitted substantial amendments to the claims to positively recite limitations which further define the structural particulars of the micro thermoelectric gas sensor, not previously presented, for consideration upon merits for patentability.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 7, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Scharvitz et al. (A combustion-based MEMS thermoelectric power generator).

Regarding claims 1-3 and 8, Schaevitz discloses thermoelectric device (**Fig. 1 and Fig. 3**) comprising: a thermally insulating silicon nitride membrane formed on a silicon wafer; a silicon-germanium thermoelectric thermopile having a hot junction and a cold junction located on the same membrane (**Fig. 2**), the thermopile being formed of a plurality of thermocouples connected in series (**pg2/C2/L9-10**); a catalyst (usually

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platinum) deposited on the channel side of the membrane and aligned with the hot end of the thermopile; and an integrated electrical heater (pg3/C2/L6).

Regarding limitations recited in claim 7, which are directed to a manner of manufacturing the disclosed gas sensor, the examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. A claim containing a recitation with respect to the manner in which a claimed apparatus is made does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 4-6, and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scharvitz et al. (A combustion-based MEMS thermoelectric power generator), as applied to claims 1-3 above, in view of Wijngaards et al. (Design and fabrication of on-chip integrated polySiGe and poly Si Peltier Devices).

Regarding limitations recited in claim 4, which are directed to a manner of manufacturing the disclosed gas sensor, the examiner notes that the determination of patentability is determined by the recited structure of the apparatus and not by a method of making said structure. A claim containing a recitation with respect to the manner in which a claimed apparatus is made does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim.

Regarding claims 4 and 5, Scharvitz discloses all of the claim limitations as set forth above. Scharvitz further discloses that the membrane is formed by KOH etching

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the backside of the silicon wafer (**pg3, see: Fabrication**), and a plurality of membranes being provided on the silicon wafer (**Fig. 1a**).

Scharvitz does not explicitly disclose the membrane having a thickness of 1  $\mu\text{m}$  or less. However, as the heat transfer rate and the temperature gradient are variables that can be modified, among others, by adjusting said thickness of the membrane, with said heat transfer rate and the temperature gradient both increasing as the membrane thickness is decreased, the precise membrane thickness would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed membrane thickness cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the thickness of the membrane in the device of Scharvitz to obtain the desired said heat transfer rate and the temperature gradient (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Wijngaards teaches a polySiGe Peltier device with a membrane formed by backside KOH etching, consisting of a 200 nm/300 nm SiN/SiO<sub>2</sub> stack (**pg 320, see: Fig. 4; and 4.2 Fabrication results**).

Since the instant specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a membrane with a thickness of 1  $\mu\text{m}$  or less in the device of Schaevitz, as taught by

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Wijngaards, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device, Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding claims 6, 25, 57, and 28, Scharvitz discloses all of the claim limitations as set forth above. Scharvitz further discloses a TiN barrier layer being PVD on the SiN membrane; and a Pt metallization layer e-beam deposited on the barrier layer (**Fig. 3; pg3, see: Fabrication**).

Scharvitz does not explicitly the integrated heater being bonded to the insulating film by the bonding film. The thermoelectric conversion material extending in a linear section: from a first periphery of the membrane where the catalyst is disposed, to a second periphery of the membrane where the microheater is disposed. The microheater further being in thermal contact with the catalytic material layer, and being electrically insulated by the insulating film.

Wijngaards teaches a polySiGe Peltier device (**Fig. 4 and Fig. 5**) with resistors for heating and temperature measurement disposed on the Al Metallization layer near the outer periphery of the membrane/thermopile areas (**see: epi mass border**).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the integrated heater on the peripheral Pt metallization layer in the device of Scharvitz, as taught by Wijngaards, since doing so would provide for a temperature stabilized micro-platform which would have further versatility in being applicable to automotive (combustion) gas sensing (**Wijngaards: pg321, see: 5.1. Thermal stabilization of on-chip references**), as well as provide for control of the output electrical power of the thermoelectric generator (since electricity is generated by the thermal gradient produced by the catalytic reaction of gases, disposing the heaters at the side of the membrane opposite of the catalytic material and near the periphery of the membrane where the substrate is thickest, would provide the most direct and precise control of the thermal gradient in the thermoelectric material film).

Regarding limitations recited in claims 26, 29, and 30, which are directed to a manner of operating disclosed sensor, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an



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intended operation are of no significance in determining patentability of the apparatus claim.”

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT EOM whose telephone number is (571)270-7075. The examiner can normally be reached on Mon.-Thur., 9:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/  
Primary Examiner, Art Unit 1797

/R. E./  
Examiner, Art Unit 1797